DOCUMENT RESUME

ED 477 034 IR 021 762

AUTHOR	Johansson, Tuovi; Ruokamo, Heli
TITLE	The Realization of Interaction in Cognitive Science Network Studies.
PUB DATE	2002-06-00
NOTE	6p.; In: ED-MEDIA 2002 World Conference on Educational Multimedia, Hypermedia & Telecommunications. Proceedings (14th, Denver, Colorado, June 24-29, 2002); see IR 021 687.
AVAILABLE FROM	Association for the Advancement of Computing in Education (AACE), P.O. Box 3728, Norfolk, VA 23514. Tel: 757-623-7588; e-mail: info@aace.org; Web site: http://www.aace.org/DL/.
PUB TYPE	Reports - Research (143) -- Speeches/Meeting Papers (150)
EDRS PRICE	EDRS Price MF01/PC01 Plus Postage.
DESCRIPTORS	Computer Assisted Instruction; *Computer Mediated Communication; Computer Networks; Cooperative Education; Cooperative Learning; *Distance Education; Foreign Countries; Higher Education; *Interaction; *Interaction Process Analysis; Student Reaction; *Teacher Student Relationship; Virtual Classrooms; *Virtual Universities
IDENTIFIERS	Finland

ABSTRACT

This paper deals with the research of the realization interaction in the Finnish Virtual University's network-based studies of cognitive science in the autumn 2001. This research examines the independent study of cognitive science which occurs through a network and the face-to-face study that takes place in cooperation in a group and the study that occurs in WebCT groups. The research seeks answers to the kind of interaction that promotes network-based studies and what causes a lack of interaction. The data was collected by questionnaires and observation. The results indicated that students considered interaction with the teacher and other students to be more binding than self-directed study. The expectations and biases of students did not always correspond to the objectives of studies and thus have prevented functional interaction in a network. (Author)

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Tuovi Johansson & Heli Ruokamo
University of Lapland
Faculty of Education
Centre for Media Pedagogy
PO Box 122, 96101 Rovaniemi
Tel. + 358 16 341 2410, Fax. + 358 16 341 2401
Email: tjohanss@urova.fi, heli.ruokamo@urova.fi

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Abstract. This article deals with the research of the realization interaction in the Finnish Virtual University's network-based studies of cognitive science in the autumn 2001. In this research, we examine the independent study of cognitive science which occurs through a network and the face-to-face study that takes place in cooperation in a group and the study that occurs in WebCT groups. The research seeks answers to the kind of interaction that promotes network-based studies and what causes a lack of interaction. The data has been collected by questionnaires and observation. The results indicated that students considered interaction with the teacher and other students more binding than self-directed study. The expectations and biases of students did not always correspond to the objectives of studies and thus have prevented functional interaction in a network.

1. Introduction

The objective of the study is to examine the realization of interaction in cognitive science network studies in the Finnish Virtual University. Good interaction with both the teacher and other students motivates and binds students to a greater degree of study (Richardson 2001). Interaction occurring through a network with the teacher and with other students is important from the perspective of learning, even if it is seen as far more laborious than studying face-to-face (Heikkinen 2000).

Interaction in a network is created by the relationship of interaction between a student, a teacher, technology, and the others who are part of the process (Ruokamo & Pohjolainen 1999). In network studies, interaction between the teacher and the student is limited, neither does it always occur in real time, and thus it presents its own challenge to successful study (Paakkola 1992).

Cognitive science can be studied in a self-directed manner, under the direction of the teacher, or with other students using a WebCT as well as on the Internet through contact teaching by studying in groups [http://www.virtuaaliyliopisto.fi/osahankkeet/connet/webct.htm].

In studying cognitive science, we utilize problem-based learning and exercises are performed face-to-face as group work (Hakkarainen, Lonka & Lipponen 1999). In the study, we examine the realization of interaction in network studies, self-directed study, as well as the adaptability of group work face-to-face exercises as part of network-based studies, and the types of problems that arise in interactive study through a network, and what the lack of interaction causes.

2. Background

The Finnish Virtual University Project [http://www.virtuaaliyliopisto.fi/English/index.php] has been established based on the information strategy of the Ministry of Education (for the years 2000–2004). Its concept is a joint virtual university in Finland consisting of several institutions for advanced learning, businesses, and research institutions that provides internationally high quality competitive training services. (Ministry of Education 1999).

The study of cognitive science in a network, in other words the Connet Project, has been planned since 1999 [http://www.virtuaaliyliopisto.fi/osahankkeet/connet/]. The project includes students from eight different universities: Helsinki, Tampere, Turku, Joensuu, Oulu, Lapland, Jyväskylä, and the Helsinki University of

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Technology. The Connet Project was coordinated by the University of Helsinki during the autumn semester 2001; with respect to the University of Lapland, it was coordinated by the Centre for Media Pedagogy (Ruokamo, Syrjäkari & Karppinen 2002). Basic studies in cognitive science began at all the universities participating in the project in the autumn 2001. Seventy-eight students had registered for the common e-mail list. Following their basic studies, the students will have the opportunity to conduct their cognitive science studies as network studies. Each university is responsible for a defined credit unit and studies will consist of modules chosen by the student.

Teaching consists of study periods in cognitive science, data processing, psychology, labour science, pedagogy, media education, cognitive technology, and the philosophy of technology. Teaching methods use the possibilities brought about by new technology that utilizes problem-based project-oriented method.

In network studies, learning is a process and a social event that needs for its support feedback and support from teachers as well as interactive study with the other students (Richardson 2001). Network students are generally highly motivated, even if the lack of social communication, interaction, and unclear expectations affect studying (Bonk 2001).

Interaction skills are important cooperative skills, but group-centred skills are broader in nature. The cooperative skills of an individual come into play only when in a community where the social activity that rewards them is organized. It is perceived that in learning, there are still too many individually centred learning models that prevent interaction and forms of communal activity. The individual needs an encouraging and socially respected operating environment. (Kuusinen 2001.)

3. The Objective and Research Questions of the Study

The study examines the realization of interaction in cognitive science network studies. Network interaction is created from different interactive contexts. The forms of interaction are the interaction between students, teacher and student, student and technology, and between the actors (Ruokamo & Pohjolainen 1999). The study examines the type of interaction that promotes network learning in the study of cognitive science and what causes the lack of interaction. A focus for examination is also self-directed study, inter-student interaction in WebCT, and the face-to-face study that takes place in groups with other course members. This study seeks answers to how self-directed study is located within the context of interaction. In multiform teaching, there is a reduction in teacher leadership; different forms of interaction, the purpose of which would be to support study, replace interaction between student and teacher (Paakkola 1992). Moreover, the study examines whether face-to-face group study best supports a student's motivation and learning in network studies, and whether it binds the student more firmly to his or her studies.

The culture of interaction in a network environment is a broad area and thus it places its own challenges on the work of research and its analysis. Research into network studies has increased in recent times, but most of the research has focused on analysing information produced for the network and the nature of student participation. The nature of a network-based social information structure and the characteristics of its interaction process have still to be studied whereas, in addition to the network environment, the entire interaction context with its discussions must receive attention. Learning is perceived as a communal process and interaction and, from the perspective of learning, it is created outside of the network environment. (Salo, Hurme & Järvelä 2001.)

4. Research Method

The study is limited to the study periods realized during basic studies in cognitive science in the autumn semester of 2001. The interaction in a network linked to study is a multifactor phenomenon. The phenomenon consists of students, teachers, the network tools of the learning environment, and other essential actors (Ruokamo & Pohjolainen 1999). In order to gain relevant information and new perspectives, interaction should be examined both quantitatively and qualitatively.

The data was collected by questionnaires and observation. The first questionnaire was performed using an Internet form and through e-mail before the actual course began. The questionnaire was sent to the 78 students that had registered for the common cognitive science students' e-mail list. The questionnaire measured the students' biases, expectations, and thoughts on the realization of interaction in the study of cognitive science.

A second questionnaire was performed at the end of the autumn semester courses. It was sent to the 78 students and to 43 students that had performed their practice work. The second questionnaire focussed on the realization of interaction in the network-based study of cognitive science and the use of WebCT tools. In

addition, the same questionnaire included questions directed at the students on the *Project Working and Creative Planning* and *Communication and Cognition* courses. The students on the *Project Working and Creative Planning* course studied in groups using the WebCT and the students on the *Communication and Cognition* course studied in face-to-face groups.

The perspective of teachers on interaction has been studied in a questionnaire directed at those teachers who gave their permission for the form to be sent. The aim has been to resolve how they think they have succeeded in creating interaction with the students, how group work has been articulated for network-based studies, and how they have experienced teaching through a network.

The project researcher has participated in cognitive science planning meetings as a participatory observer since the spring of 2001 and she has collected data using the teachers' and assistants' common e-mail list. Moreover, the researcher has participated as a student-observer for the video lectures on the *Communication and Cognition* course.

The Likert scale theorems of the questionnaires have been processed by quantitative methods using the SPSS statistics application. The participatory observations of the researcher as well as the data collected using open questionnaires has been analysed using qualitative methods.

5. Results and Conclusions of the Study

Eleven students (15.4 %) returned the first questionnaire and 16 students (13.2 %) returned the second questionnaire. The students encountered technical problems in returning both the Internet-based questionnaire and the one sent by e-mail in Word format. Twenty-seven forms were used in the study. There were more returned, but these were either empty or insufficiently completed or the student had not completed his or her network-based studies into cognitive science even though his or her name appeared on the e-mail list.

When examining self-directed study in a network in relation to other network interaction, students saw interaction with teachers and other students as more binding that self-directed study. Network interaction was seen as more binding in relation to time and place than self-directed study was. Part of the courses had to be completed as video lectures and study diaries. The defined times of video lectures and their related study diaries to a degree prevented graduate students and those students at work from completing the courses in question. Network-based study is generally seen as study independent of time and place and it is also marketed as such. In this relation, the pre-expectations of the students for study independent of time and place were not realized.

In the pre-expectations of the students before courses began, it was apparent that teachers did not have a clear picture of the possibilities provided by network-based teaching. The students in different localities considered important the help and guidance of a local guide and responsible person, the possibility to discuss courses, as well as the opportunity for technical support. Interaction with the teacher, especially in the initial phase of the courses, acts as a motivating factor for a course.

The interaction between the students in the study has been examined in the face-to-face group work on the *Communication and Cognition* course and in the WebCT group work on the *Project Working and Creative Planning* course. Face-to-face group work was conceived as being part of network-based studies. It was seen to make handling matters easier and students thus gained extra motivation for other network-based study. Typical problems related to the performance of group work, such as the heterogeneity of the group and the uneven distribution of responsibility, were seen in the face-to-face group work. The groups included students from different localities, so dstances and timetables prevented and slowed study. The students did not consider slowing or preventing studies as the intention of network-based studies.

Based on the open questions in the qualitative examination of face-to-face practice, contact teaching arose as the best form of guidance, next was video-conferencing and in addition to these, e-mail. The students thought all forms of teaching supported one another, when they were well organized.

In the students' (N=11) pre-expectations, it was apparent that almost half the students (45.5 %) to a degree believed that WebCT supported interaction between a student and other students. Almost one-third of the students (27.3 %) did not have the same or a different opinion; less than one-fifth (18.2 %) was somewhat of a different opinion and only one student was of a different opinion. Over one-third of the students had pre-expectations that WebCT would to a degree support the interaction between the student and teacher. Only one student has the same opinion. Less than one-fifth (18.2 %) of the students did not have the same or a different opinion, similarly were to a degree of a different opinion and the same number were of a different opinion (18.2 %).

The group on the *Project Working and Creative Planning* course was formed though WebCT *discussions* field. More real-time discussion would have been needed at the beginning of studies and there would have been a

need for functional group working. There was limited experimenting with WebCT in group work, and it was not found to support the group's joint writing process.

The students (N=16) evaluated the best interactive situations on a scale of 4–10. The best interactive situations among the students were created: 1. in practice work (mean = 9), 2. with e-mail (mean = 8.3), 3. in contact teaching (mean = 8.2) and 4. in WebCT *discussions* (mean = 7.6). Other interactive situations were realized using WebCT communication and group tools, the mean of which varied between 5.8–6.5.

The students (N=16) chose the best interactive tools on a scale of 4–10. The best interactive tools were: 1. some e-mail other than WebCT (mean = 8.5), 2. video-conferencing (mean = 7.8), 3. contact teaching (mean = 7.6), 4. in WebCT *discussions* (mean = 7), 5. WebCT e-mail (mean = 6.6), 6. the WebCT notice board (mean = 6.3), 7. telephone discussions (mean = 6), and 8. WebCT real-time discussion (mean = 5.7).

The fluent and versatile use of a learning environment appears to increase the entire interaction with the student, teacher, and other students. Those coming on a network-based course for the first time need guidance and instructions on the use of the learning environment and its tools. The use of WebCT in the study of cognitive science could include credits during the orientation phase to studies. In other respects, the biases of the students to computers, the use of e-mail and information searches were good in relation to their own skills.

The interaction between actors was observed using the common email list. Email functions as a common information channel between teachers, designers, and assistants. A common email list provides support for the actors to agree on plans, timetable, and meetings.

The objectives of teaching and the expectations of students do not always correspond to each other. A factor affecting interaction is the cultural background to the organization arranging teaching. The results of the research support the importance of guiding teachers and other students in network-based studies. Face-to-face study should be a part of network-based studies. However, self-directed study in a network should be respected and various opportunities should be provided on courses for interactive contexts.

The research has examined interaction from various interaction contexts as well as noted self-directed study and how it is located within the context of interaction. The research has become extensive and it has provided a lot of information and additional material for those organizations arranging teaching and for all those interested in interaction in network-based study and teaching. The information and additional material from the research can benefit educational purposes, the development of learning environments, and follow-up research both in Finland and internationally.

This study examined different face-to-face group work and the group work that takes place in a learning environment. The researcher's personal interest has grown in studying face-to-face group work and the integration of group work into a network-based learning environment and thus into the appearance of the observed problems as well as into the development of the fluent and versatile opportunities for network-based group work.

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